

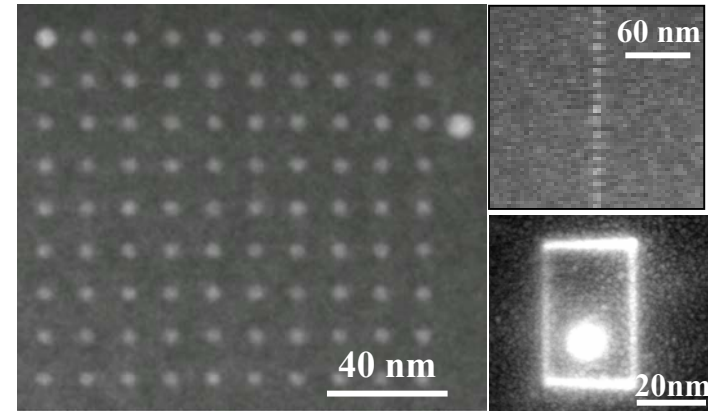
Synthesis of Uniform GaN Quantum Dot Arrays via Electron Nanolithography

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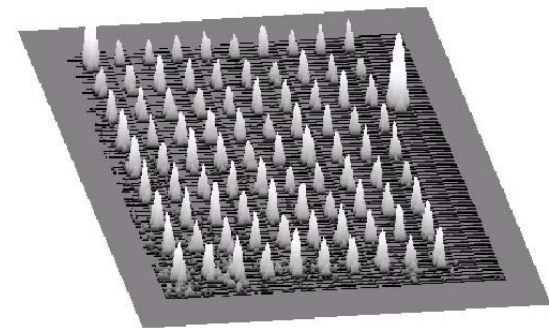
Synthesis of nanostructures based on group III nitrides are of considerable interest because of potential applications in high performance optoelectronics and information processing. We demonstrate the creation of periodic arrays of GaN quantum dots on Si substrates with highly uniform sizes and specifically designed geometries. The dots are deposited using a unique nanolithography technique based on a combination of electron beam induced chemical vapor deposition and novel single-source molecular hydride chemistries.



Under appropriate conditions, we can deposit uniform dots 5 nm in height and full width half maxima of 4 nm. Our approach represents a general straightforward synthetic route to a host of useful and novel materials including binary and ternary semiconductors with controlled stoichiometries, sizes, shapes and geometries at the nanoscale.(in collaboration with Dr. Crozier at ASU)



Z-contrast electron microscope images of two-dimensional (left) and one dimensional (top right) periodic arrays of GaN dots. (bottom) Nanobox drawn around a larger GaN dot



3-D representation from a periodic array of uniform GaN dots.